Cloud Droplet Characterization System for Unmanned Aircraft, Phase II

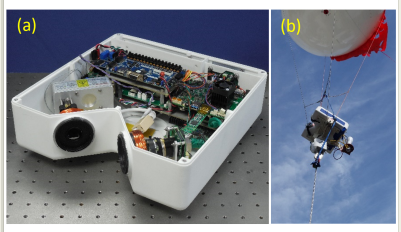
Completed Technology Project (2016 - 2019)

Project Introduction

Atmospheric clouds have strong impact on the global radiative budget. Cloud's radiative properties are strongly affected by droplet size distribution and number concentration. This SBIR project will develop an innovative, compact and inexpensive droplet measurement system (DMS), which will provide in situ measurement of droplet size distribution function and droplet number concentration in clouds. The DMS will be designed to meet the demanding requirements for deployment on small unmanned aerial research platforms including balloons, blimps and small UAVs. The Phase I study demonstrated the feasibility of the proposed method, identified the engineering challenges to be addressed in Phase II and outlined the strategy for further development of the technology. In Phase II a flight-ready compact, lightweight and low-power prototype system will be designed, constructed and field-tested. The Phase II development will provide a solid basis for further commercialization of the proposed technology.

Anticipated Benefits

The proposed DMS technology will address the NASA's need to add in situ cloud measurement capabilities to small unmanned aerial research platforms such as balloons, blimps and small UAVs. Deployment of the DMS implemented as a compact and lightweight economic package on small aerial platforms will result in reduced costs and improved coverage of the NASA's atmospheric measurement campaigns. Precise and extensive cloud characterization data will lead to better understanding of the contribution of atmospheric clouds to Earth's radiative budget and climate change. Other potential applications include characterization of atmospheric aerosols, particulate matter in volcanic ash plumes and fuel sprays.The proposed DMS will be of interest to research institutions and government agencies involved in atmospheric measurements. Flexibility and low cost of the proposed technology will make it compatible with a variety of airborne and ground based platforms and suitable for other applications such as characterization of atmospheric aerosols, volcanic ash plumes and industrial/agricultural sprays.



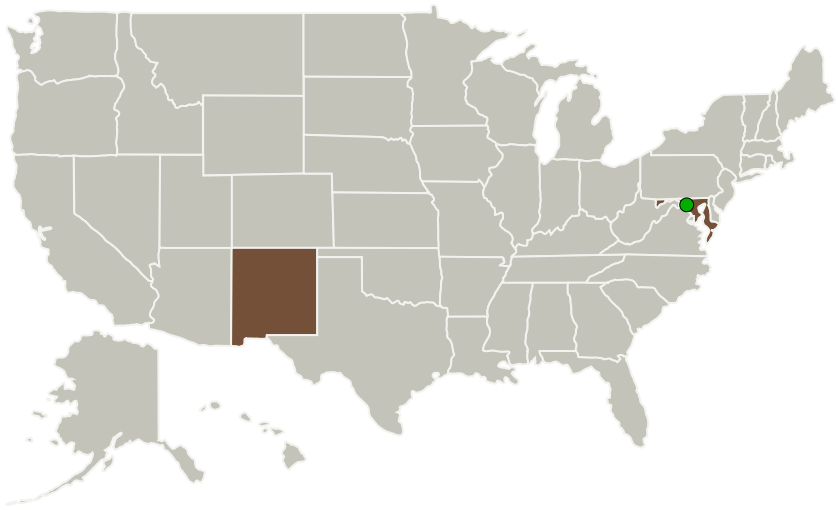
Cloud Droplet Characterization System for Unmanned Aircraft, Phase II

Table of Contents

Cloud Droplet Characterization System for Unmanned Aircraft, Phase II

Completed Technology Project (2016 - 2019)

Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
Mesa Photonics, LLC	Lead Organization	Industry	Santa Fe, New Mexico
Goddard Space Flight Center(GSFC)	Supporting Organization	NASA Center	Greenbelt, Maryland

Primary U.S. Work Locations	
Maryland	New Mexico

Project Transitions

April 2016: Project Start

April 2019: Closed out

Closeout Documentation:

- Final Summary Chart PDF*(https://techport.nasa.gov/file/139639)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Mesa Photonics, LLC

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Project Managers:

David B Wolff
Joseph Famiglietti

Principal Investigator:

Andrei B Vakhtin

Co-Investigator:

Andrei Vakhtin

Cloud Droplet Characterization System for Unmanned Aircraft, Phase II

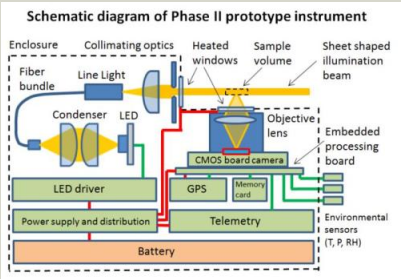
Completed Technology Project (2016 - 2019)

April 2019: Closed out

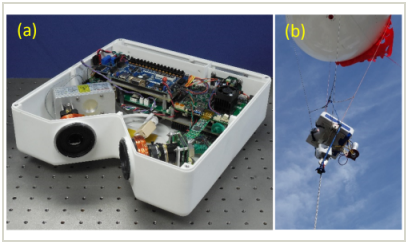
Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/139638)*

Images



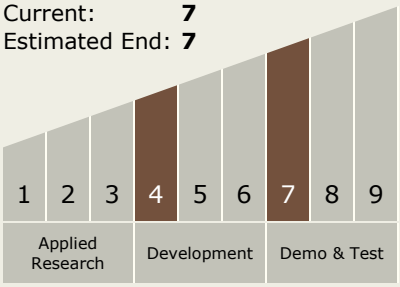
Briefing Chart Image
Cloud Droplet Characterization System for Unmanned Aircraft, Phase II
(https://techport.nasa.gov/image/134314)



Final Summary Chart Image
Cloud Droplet Characterization System for Unmanned Aircraft, Phase II
(https://techport.nasa.gov/image/135711)

Technology Maturity (TRL)

Start: **4**
Current: **7**
Estimated End: **7**



Target Destinations

The Moon, Mars, Outside the Solar System, The Sun, Earth, Others Inside the Solar System